No of Pages : 2 **Course Code : 12P701**

Roll No:
(To be filled in by the candidate)

PSG COLLEGE OF TECHNOLOGY, COIMBATORE - 641 004

SEMESTER EXAMINATIONS, OCTOBER / NOVEMBER - 2015

BE - PRODUCTION ENGINEERING Semester: 7

12P701 SENSORS, AUTOMATION AND MODULAR PRODUCTION SYSTEMS

Time : 3 Hours **Maximum Marks : 100**

INSTRUCTIONS:
1. Answer **ALL** questions from GROUP – I.
2. Answer any **FOUR** questions from GROUP – II.
3. Answer any **ONE** question from GROUP – III.
4. Ignore the box titled as **“Answers for Group III”** in the Main Answer Book.

GROUP - I **Marks : 10 x 3 = 30**

1. Bring out the meaning of the term “Intelligent Sensor”.
2. What are the advantages of using optical fibers in a measurement system?
3. List the different levels of control in CIM.
4. Give a schematic representation of different levels of integration of CIM.
5. What are the basic components of an automated storage/retrieval system?
6. What are the effects of poor quality parts, as represented by fraction defective rate, on the performance of an automated assembly system?
7. List the factors to be considered while designing the feed track of a part feeding system.
8. “Synchronous transfer is best suited for manual flow lines”. Comment on this statement.
9. Give the function of a router.
10. Write the benefits of MPS.

GROUP - II **Marks : 4 x 12.5 = 50**

11. Explain in detail the need for implementation of CIM in an industry.
12. Elaborate on the characteristics of any three non-contact proximity-sensing systems.
13. Discuss about the OSI model in network communications.
14. a) A feeder selector device at one of the stations of an automated assembly line has a feed rate of 30 parts per minute and a throughput of one part in four. The ideal cycle rate of the workstation is 400 assemblies per hour. The synchronous assembly line has eight stations. Average downtime per jam is 2.5 min and the frequency of breakdown is once every 50 parts. The feed track serves as a temporary bank of parts. The upper level of the feed track is set at 25 parts and the lower level at 10 parts. If these two levels are to be controlled using a PLC timer, what should be the preset time values? (10)

    b) What will be the effect of increasing or decreasing the feeder-selector rate in this application? (2.5)

15. An automated assembly machine has four workstations. The first station presents the base part, and the other three stations add parts to the base. The ideal cycle time for the machine is 3 sec and the average downtime when a jam results from a defective part is 1.5 min. The fraction defective rates (*q*) and probabilities that a defective part will jam the station (*m*) are given in the table below. Quantities of 100,000 for each of the bases, brackets, pins, and retainers are used to stock the assembly line for operation. Determine (a) proportion of good product to total product coming off the line, (b) production rate of good product coming off the line, (c) total number of final assemblies produced, given the starting component quantities. Of the total, how many are good product, and how many are products that contain at least one defective component? (d) Of the number of defective assemblies determined in above part (c) how many will have defective base parts? How many will have defective brackets? How many will have defective pins? How many will have defective retainers?

Station	Part identification	*q*	*m*
1	Base	0.01	1.0
2	Bracket	0.02	1.0
3	Pin	0.03	1.0
4	Retainer	0.04	0.5

GROUP - III **Marks : 1 x 20 = 20**

16. Develop a schematic model of the architecture for online monitoring of hard turning process. Elaborate on the various components of the architecture.

17. A fully automated large manufacturing system uses power and free method for workpart transfer. A set of 50 AGVs are to be used for handling the heavy work parts. The layout requires the AGV pathway network to be changed frequently. Fill the following table based on the above information. Substantiate the answers with appropriate reasons.

S.no	**AGV Characteristics**	**Type or method that best suits the application**
1	Type of AGV	
2	AGV Guidance technique	
3	Dispatch method	
4	Dead reckoning	

/END/

FD/RL